ABSTRACT

Methods for the transformation of shapes in Computer Aided Design (CAD) applications applying a general function composition mechanism with any arbitrary function. This method allows the geometry of a shape to be transformed by any generic function while maintaining the topography of the shape. To enable this transformation, the underlying geometry of a shape must either be expressed in terms of surface and curve functions and positions underlying the faces, edges and vertices respectively of the shape, or be capable of being converted into such a representation.

Once the underlying geometry of the shape has been represented as a set of functions and positions, the functions are composed with an arbitrary transformation function to define new surface and curve functions. The positions are merely passed through the transformation function. Once the new functions and positions have been created, the geometry of the transformed shape can be found by passing each point in the domain of each original geometry function through the new transformed function. The resulting set of points is the geometry for the transformed shape. This shape may then be displayed to the user, and the steps of this method repeated for refinement of the transformation function.